

---

---

# UPDATE

---

---

## *Nurses: Partners in Asthma Care*

The few changes listed below are needed to make *Nurses: Partners in Asthma Care*, published in 1995, consistent with the 1997 *Expert Panel Report 2: Guidelines for the Diagnosis and Management of Asthma* (EPR-2). The nurses' guide was originally prepared based on the first Expert Panel Report published in 1991.

**Page 3 Goals of Asthma Management**

A sixth goal has been added: "Meet patients' and families' expectations of and satisfaction with asthma care."

**Page 6 Objective Measures of Lung Function**

The EPR-2 emphasizes that all patients be taught to monitor symptoms to recognize early signs of deterioration and patients with moderate-to-severe asthma should use peak flow monitoring.

**Page 8 Pharmacotherapy**

The EPR-2 now categorizes medications into two general classes: long-term-control medications used to achieve and maintain control of persistent asthma and quick-relief medications used to treat acute symptoms and exacerbations.

**Page 9 Classification of Asthma by Severity of Disease Before Treatment**

Severity classifications have been changed. (Essentially, mild intermittent = original mild; mild persistent and moderate persistent = original moderate; severe persistent = original severe.) See the attached Figure 3 from the 1997 *Practical Guide for the Diagnosis and Management of Asthma*.

**Appendix A: Dosages and Side Effects of Medications for Chronic Asthma**

The attached Figure 4 and table, "Estimated Comparative Daily Dosages for Inhaled Steroids," from the 1997 *Practical Guide for the Diagnosis and Management of Asthma*, reflect some changes in dosing, estimated comparative daily dosages, as well as new information on leukotriene modifiers and long-acting inhaled beta<sub>2</sub>-agonists.

**Appendix D: How To Use Your Peak Flow Meter (Patient Handout)**

To determine personal best, the patient is no longer instructed to take readings *before* inhaling a beta<sub>2</sub>-agonist *and* in the morning. Measurements should be taken *after* using an inhaled short-acting beta<sub>2</sub>-agonist *and* in the early afternoon.

**Appendix D: My Asthma Symptoms and Peak Flow Diary (Patient Handout)**

Daily peak flow readings are now recommended only for the morning. However, if the morning reading is less than 80 percent of the patient's personal best, peak flow should be measured more than once a day to assess progress.



Figure 3.

### Classification of Asthma Severity: Clinical Features Before Treatment

	Days With Symptoms	Nights With Symptoms	PEF or FEV <sub>1</sub> *	PEF Variability
<b>Step 4</b> Severe Persistent	Continual	Frequent	≤60%	>30%
<b>Step 3</b> Moderate Persistent	Daily	≥5/month	>60%-<80%	>30%
<b>Step 2</b> Mild Persistent	3-6/week	3-4/month	≥80%	20-30%
<b>Step 1</b> Mild Intermittent	≤2/week	≤2/month	≥80%	<20%

\* Percent predicted values for forced expiratory volume in 1 second (FEV<sub>1</sub>) and percent of personal best for peak expiratory flow (PEF) (relevant for children 6 years old or older who can use these devices).

**NOTES:**

- Patients should be assigned to the most severe step in which *any* feature occurs. Clinical features for individual patients may overlap across steps.
- An individual's classification may change over time.
- Patients at any level of severity of chronic asthma can have mild, moderate, or severe exacerbations of asthma. Some patients with intermittent asthma experience severe and life-threatening exacerbations separated by long periods of normal lung function and no symptoms.
- Patients with two or more asthma exacerbations per week (i.e., progressively worsening symptoms that may last hours or days) tend to have moderate-to-severe persistent asthma.

The National Heart, Lung, and Blood Institute (NHLBI) of the National Institutes of Health maintains the NHLBI Information Center. This center provides information to health professionals, patients, and the public about the treatment, diagnosis, and prevention of heart, lung, and blood diseases.

NHLBI Information Center  
P.O. Box 30105  
Bethesda, MD 20824-0105  
Telephone: (301) 251-1222  
Fax: (301) 251-1223

In addition, the NHLBI maintains a World Wide Web site.

<http://www.nhlbi.nih.gov>

Figure 4.

## Stepwise Approach for Managing Asthma in Adults and Children Over 5 Years Old: Treatment

Long-Term Control	
Preferred treatments are in bold print.	
<b>Step 4</b> <b>Severe Persistent</b>	<p>Daily medications:</p> <ul style="list-style-type: none"> <li>■ <b>Anti-inflammatory: inhaled steroid (high dose)* AND</b></li> <li>■ Long-acting bronchodilator: either <b>long-acting inhaled beta<sub>2</sub>-agonist</b> (adult: 2 puffs q 12 hours; child: 1-2 puffs q 12 hours), sustained-release theophylline, or long-acting beta<sub>2</sub>-agonist tablets AND</li> <li>■ Steroid tablets or syrup long term; make repeated attempts to reduce systemic steroid and maintain control with high-dose inhaled steroid.</li> </ul>
<b>Step 3</b> <b>Moderate Persistent</b>	<p>Daily medication:</p> <ul style="list-style-type: none"> <li>■ Either               <ul style="list-style-type: none"> <li>—<b>Anti-inflammatory: inhaled steroid (medium dose)*</b></li> </ul> </li> <li>OR               <ul style="list-style-type: none"> <li>—<b>Inhaled steroid (low-to-medium dose)*</b> and add a long-acting bronchodilator, especially for nighttime symptoms: either <b>long-acting inhaled beta<sub>2</sub>-agonist</b> (adult: 2 puffs q 12 hours; child: 1-2 puffs q 12 hours), sustained-release theophylline, or long-acting beta<sub>2</sub>-agonist tablets.</li> </ul> </li> <li>■ If needed               <ul style="list-style-type: none"> <li>—Anti-inflammatory: <b>inhaled steroids (medium-to-high dose)*</b></li> <li>AND</li> <li>—Long-acting bronchodilator, especially for nighttime symptoms; either <b>long-acting inhaled beta<sub>2</sub>-agonist</b>, sustained-release theophylline, or long-acting beta<sub>2</sub>-agonist tablets.</li> </ul> </li> </ul>
<b>Step 2</b> <b>Mild Persistent</b>	<p>Daily medication:</p> <ul style="list-style-type: none"> <li>■ <b>Anti-inflammatory: either inhaled steroid (low dose)* or cromolyn</b> (adult: 2-4 puffs tid-qid; child: 1-2 puffs tid-qid) or <b>nedocromil</b> (adult: 2-4 puffs bid-qid; child: 1-2 puffs bid-qid) (children usually begin with a trial of cromolyn or nedocromil).</li> <li>■ Sustained-release theophylline to serum concentration of 5-15 mcg/mL is an alternative, but not preferred, therapy. Zafirlukast or zileuton may also be considered for those ≥12 years old, although their position in therapy is not fully established.</li> </ul>
<b>Step 1</b> <b>Mild Intermittent</b>	<ul style="list-style-type: none"> <li>■ No daily medication needed.</li> </ul>
Quick-Relief	
<b>All Patients</b>	Short-acting bronchodilator: <b>inhaled beta<sub>2</sub>-agonist</b> (2-4 puffs) as needed for symptoms. Intensity of treatment will depend on severity of exacerbation.

\*See Estimated Comparative Daily Dosages for Inhaled Steroids.

### NOTES:

- *The stepwise approach presents general guidelines to assist clinical decisionmaking. Asthma is highly variable; clinicians should tailor medication plans to the needs of individual patients.*
- **Gain control** as quickly as possible. Either start with aggressive therapy (e.g., add a course of oral steroids or a higher dose of inhaled steroids to the therapy that corresponds to the patient's initial step of severity); or start at the step that corresponds to the patient's initial severity and step up treatment, if necessary.
- **Step down:** Review treatment every 1 to 6 months. Gradually decrease treatment to the least medication necessary to maintain control.
- **Step up:** If control is not maintained, consider step up. Inadequate control is indicated by increased use of short-acting beta<sub>2</sub>-agonists and in: step 1 when patient uses a short-acting beta<sub>2</sub>-agonist more than two times a week; steps 2 and 3 when patient uses short-acting beta<sub>2</sub>-agonist on a daily basis or more than three to four times in 1 day. But before stepping up: Review patient inhaler technique, compliance, and environmental control (avoidance of allergens or other precipitant factors).
- A course of oral steroids may be needed at any time and at any step.
- Patients with exercise-induced bronchospasm should take two to four puffs of an inhaled beta<sub>2</sub>-agonist 5 to 60 minutes before exercise.
- Referral to an asthma specialist for consultation or comanagement is *recommended* if there is difficulty maintaining control or if the patient requires step 4 care. Referral may be *considered* for step 3 care.
- For a list of brand names, see glossary.

## Estimated Comparative Daily Dosages for Inhaled Steroids

### Adults

Inhaled Steroid	Low Dose	Medium Dose	High Dose
<b>Beclomethasone dipropionate</b> 42 mcg/puff 84 mcg/puff	168-504 mcg <b>4-12 puffs—42 mcg</b> <b>2-6 puffs—84 mcg</b>	504-840 mcg <b>12-20 puffs—42 mcg</b> <b>6-10 puffs—84 mcg</b>	>840 mcg <b>&gt;20 puffs—42 mcg</b> <b>&gt;10 puffs—84 mcg</b>
<b>Budesonide DPI</b> 200 mcg/dose	200-400 mcg <b>1-2 inhalations</b>	400-600 mcg <b>2-3 inhalations</b>	>600 mcg <b>&gt;3 inhalations</b>
<b>Flunisolide</b> 250 mcg/puff	500-1,000 mcg <b>2-4 puffs</b>	1,000-2,000 mcg <b>4-8 puffs</b>	>2,000 mcg <b>&gt;8 puffs</b>
<b>Fluticasone MDI:</b> 44, 110, 220 mcg/puff  <b>DPI:</b> 50, 100, 250 mcg/dose	<b>2-6 puffs—44 mcg or</b> <b>2 puffs—110 mcg</b>  <b>2-6 inhalations—50 mcg</b>	<b>2-6 puffs—110 mcg</b>  <b>3-6 inhalations—100 mcg</b>	<b>&gt;6 puffs—110 mcg or</b> <b>&gt;3 puffs—220 mcg</b>  <b>&gt;6 inhalations—100 mcg</b> <b>or</b> <b>&gt;2 inhalations—250 mcg</b>
<b>Triamcinolone acetonide</b> 100 mcg/puff	400-1,000 mcg <b>4-10 puffs</b>	1,000-2,000 mcg <b>10-20 puffs</b>	>2,000 mcg <b>&gt;20 puffs</b>

### Children ≤12 years

Inhaled Steroid	Low Dose	Medium Dose	High Dose
<b>Beclomethasone dipropionate</b> 42 mcg/puff 84 mcg/puff	84-336 mcg <b>2-8 puffs—42 mcg</b> <b>1-4 puffs—84 mcg</b>	336-672 mcg <b>8-16 puffs—42 mcg</b> <b>4-8 puffs—84 mcg</b>	>672 mcg <b>&gt;16 puffs—42 mcg</b> <b>&gt;8 puffs—84 mcg</b>
<b>Budesonide DPI</b> 200 mcg/dose	100-200 mcg	200-400 mcg <b>1-2 inhalations—200 mcg</b>	>400 mcg <b>&gt;2 inhalations—200 mcg</b>
<b>Flunisolide</b> 250 mcg/puff	500-750 mcg <b>2-3 puffs</b>	1,000-1,250 mcg <b>4-5 puffs</b>	>1,250 mcg <b>&gt;5 puffs</b>
<b>Fluticasone MDI:</b> 44, 110, 220 mcg/puff  <b>DPI:</b> 50, 100, 250 mcg/dose	<b>2-4 puffs—44 mcg</b>  <b>2-4 inhalations—50 mcg</b>	<b>4-10 puffs—44 mcg or</b> <b>2-4 puffs—110 mcg</b>  <b>2-4 inhalations—100 mcg</b>	<b>&gt;4 puffs—110 mcg or</b> <b>&gt;2 puffs—220 mcg</b>  <b>&gt;4 inhalations—100 mcg</b> <b>or</b> <b>&gt;2 inhalations—250 mcg</b>
<b>Triamcinolone acetonide</b> 100 mcg/puff	400-800 mcg <b>4-8 puffs</b>	800-1,200 mcg <b>8-12 puffs</b>	>1,200 mcg <b>&gt;12 puffs</b>

- Clinician judgment of patient response is essential to appropriate dosing. Once asthma is controlled, medication doses should be carefully titrated to the minimum dose required to maintain control, thus reducing the potential for adverse effect.
- Data from *in vitro* and clinical trials suggest that different inhaled corticosteroid preparations are not equivalent on a per puff or microgram basis. However, few data directly compare the preparations. The Expert Panel developed recommended dose ranges for different preparations based on available data.

- Inhaled corticosteroid safety data suggest dose ranges for children equivalent to beclomethasone dipropionate 200-400 mcg/day (low dose), 400-800 mcg/day (medium dose), and >800 mcg/day (high dose).



National Asthma Education and Prevention Program